

REMARKS

Claims 1-4 and 9-10 have been amended, claims 11-20 have been cancelled, and claims 21-37 have been added.

The new and amended claims are supported by the originally filed application. For example, support can be found at page 4, line 5, page 5, lines 9-18, and page 8, lines 16-26.

CONCLUSION

Prior to taking up the above-identified application for examination, the Examiner is asked to enter the above the amendments to the title, abstract, specification, and claims. The amendments to the specification add no new matter.

It is believed that the claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representative, Ann M. Mueting, at the below listed number if it is believed that prosecution of this application may be assisted thereby.

CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper is being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on this 12th day of April, 2001.


Ann M. Mueting

Date

April 12, 2001

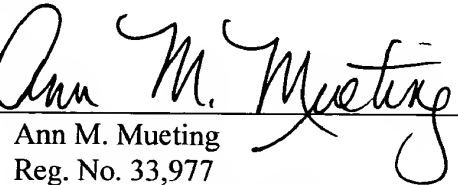
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Respectfully submitted,

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**APPENDIX A - SPECIFICATION/CLAIM AMENDMENTS INCLUDING
NOTATIONS TO INDICATE CHANGES MADE**

Serial No.: 09/756,429

Filed: January 8, 2001

In The Title

The title has been amended as follows:

GLASS MICROSPHERES FOR USE IN [REAR] FILMS AND PROJECTION SCREEN
DISPLAYS [AND METHODS]

In the Specification

The title has been amended as follows:

GLASS MICROSPHERES FOR USE IN [REAR] FILMS AND PROJECTION SCREEN
DISPLAYS [AND METHODS]

The paragraph beginning at page 15, line 1, has been amended as follows:

This is followed by applying an opaque material onto the substrate. The opaque material may be applied as a liquid coating, such as a polymeric material dissolved in a suitable solvent system. Alternatively, it may be extruded onto the substrate as a melted thermoplastic resin. The thickness of the layer of opaque material is determined by the volume of the interstices between microspheres. These interstices should be filled. Is the opaque material is applied by a solvent based coating process, it is convenient to partially dry the coating, apply the microspheres, typically by drop coating, and press them into contact with surface 3 (Figure 1). After the microspheres have been pressed into place, the drying of opaque material may be completed. Preferably, prior to application, the microspheres are treated with a fluorochemical compound as disclosed in U.S. Pat. No. [3,22,204] 3,222,204 (Weber).

In the Claims

For convenience, all pending claims are shown below:

1. (AMENDED)A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres:

have an average index of refraction of no greater than about 1.50 to about 1.70;
comprise, on a theoretical oxide basis based on the amount of starting materials:
greater than about 5 wt-% total of an alkali metal oxide selected from the
group of Na₂O, K₂O, Li₂O, and [mixtures] combinations thereof;
no greater than about 40 wt-% SiO₂; and
no less than about 10 wt-% TiO₂; and
as produced have less than about 15% defects in a population, and include less
than the total amount of alkali metal oxide than the theoretical amount based on
the amount of starting materials.

2. (AMENDED) The rear projection screen of claim 1 wherein the glass microspheres
comprise, on a theoretical oxide basis based on starting materials:
no greater than about 40 wt-% SiO₂;
no less than about 10 wt-% TiO₂;
[no less than about 5 wt-% B₂O₃];
no less than about 20 wt-% total of an alkaline earth modifier selected from the group
of BaO, SrO, and [mixtures] combinations thereof; and
greater than about 5 wt-% total of an alkali metal oxide selected from the group of
Na₂O, K₂O, Li₂O, and [mixtures] combinations thereof.
3. (AMENDED) The rear projection screen of claim 1 wherein the glass microspheres
comprise, on a theoretical oxide basis based on starting materials:
no greater than about 31 wt-% SiO₂;
no less than about 15 wt-% TiO₂;
[no less than about 10 wt-% B₂O₃];
no less than about 25 wt-% total of an alkaline earth modifier selected from the group
of BaO, SrO, and [mixtures] combinations thereof; and

no less than about 10 wt-% total of an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and [mixtures] combinations thereof.

4. The rear projection screen of claim 1 wherein the microspheres have an average index of refraction of about 1.60 to about 1.70.
5. The rear projection screen of claim 1 wherein the microspheres comprise Li₂O.
6. The rear projection screen of claim 5 wherein the microspheres comprise , on a theoretical oxide basis based on starting materials, at least about 0.25 wt-% Li₂O.
7. The rear projection screen of claim 1 wherein the microspheres are prepared from a composition that melts below a temperature of about 1350°C.
8. The rear projection screen of claim 1 wherein the microspheres are coated with a flow control agent.
9. (AMENDED) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres:
 - have an average index of refraction of no greater than about 1.70;
 - comprise, on a theoretical oxide basis based on the amount of starting materials:
 - no greater than about 40 wt-% SiO₂;
 - no less than about 10 wt-% TiO₂;
 - [no less than about 5 wt-% B₂O₃;
 - no less than about 20 wt-% total of an alkaline earth modifier selected from the group of BaO, SrO, and mixtures thereof; and

greater than about 5 wt-% total of an alkali metal oxide selected from the group of Na_2O , K_2O , Li_2O , and [mixtures] combinations thereof, and wherein the microspheres include less than the total amount of alkali metal oxide than the theoretical amount based on the amount go starting materials.

10. (AMENDED) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres:

have an average index of no greater than about 1.50 to 1.70;

comprise, on a theoretical oxide basis based on the amount of starting materials:

greater than about 5 wt-% total of an alkali metal oxide selected from the group of Na_2O , K_2O , Li_2O , and [mixtures] combinations thereof, with the proviso that Li_2O is present;

no greater than about 40 wt-% SiO_2 ; and

no less than about 10 wt-% TiO_2 ; and

as produced, have less than about 15% defects in a population, and included less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

11. (CANCELED)

12. (CANCELED)

13. (CANCELED)

14. (CANCELED)

15. (CANCELED)

16. (CANCELED)

17. (CANCELED)

18. (CANCELED)

19. (CANCELED)

20. (CANCELED)

21. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and further wherein, as produced, the microspheres have no greater than about a 15% defect level in a population.

22. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof.

23. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and further

wherein the glass microspheres are prepared from a composition that melts below a temperature of about 1350°C.

24. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

no less than about 20 wt-% total of one or more alkaline earth modifiers selected from the group of BaO, SrO, and combinations thereof; and

greater than about 5 wt-% total of one or more alkali metal oxides selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof;

wherein, as produced, the microspheres include less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

25. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

no less than about 20 wt-% total of BaO and SrO; and

greater than about 5 wt-% total of Na₂O and K₂O;

wherein, as produced, the microspheres include less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

26. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof; and

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof.

27. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise:

SiO₂;

TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof;

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and

a component selected from the group of ZnO, Al₂O₃, As₂O₃, CaO, and combinations thereof.

28. (NEW) A rear projection screen comprising a plurality of glass microspheres in optical contact with a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof;

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and

no greater than about 10 wt-% total of a component selected from the group of ZnO, Al₂O₃, As₂O₃, CaO, and combinations thereof.

29. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and further wherein, as produced, the microspheres have less than about a 15% defect level in a population.

30. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; wherein the microspheres are prepared from a composition that melts below a temperature of about 1350°C; and further wherein, as produced, the microspheres have no greater than about a 15% defect level in a population, and include less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

31. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof.

32. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres:

have an average index of refraction of no greater than about 1.70;

comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

no less than about 20 wt-% total of one or more alkaline earth modifiers selected from the group of BaO, SrO, and combinations thereof; and

greater than about 5 wt-% total of one or more alkali metal oxides selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof;

wherein, as produced, the microspheres have no greater than about 15% defects in a population, and include less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

33. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres:

have an average index of refraction of no greater than about 1.70;

comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

no less than about 20 wt-% total of BaO and SrO; and

greater than about 5 wt-% total of Na₂O and K₂O;

wherein, as produced, the microspheres have no greater than about 15% defects in a population, and include less than the total amount of alkali metal oxide than the theoretical amount based on the amount of starting materials.

34. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof; and

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof.

35. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise:

SiO₂;

TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof;

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and

a component selected from the group of ZnO, Al₂O₃, As₂O₃, CaO, and combinations thereof.

36. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise, on a theoretical oxide basis, based on the amount of starting materials:

no greater than about 40 wt-% SiO₂;

no less than about 10 wt-% TiO₂;

an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof;

an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof; and

no greater than about 10 wt-% total of a component selected from the group of ZnO, Al₂O₃, As₂O₃, CaO, and combinations thereof.

37. (NEW) A film comprising a plurality of glass microspheres disposed on a substrate comprising an acrylic and embedded in an opaque matrix; wherein the glass microspheres have an average index of refraction of no greater than about 1.70 and comprise: SiO₂; TiO₂; an alkaline earth modifier selected from the group of BaO, SrO, and combinations thereof; and an alkali metal oxide selected from the group of Na₂O, K₂O, Li₂O, and combinations thereof.